UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF WISCONSIN

FISHER-BARTON BLADES, INC.,

Plaintiff-Counter-Defendant,

v. **Case No. 05-C-460**

BLOUNT, INC.,
DIXON INDUSTRIES, and
FREDERICK MANUFACTURING CORP.,

Defendants-Counterclaimants.

DECISION AND ORDER

This patent action is before the Court on a motion for summary judgment of non-infringement and patent invalidity of U.S. Patent No. 5,916,114 ("'114 patent") filed by the Defendants, Blount, Inc. ("Blount"), Dixon Industries ("Dixon"), and Frederick Manufacturing Corp. ("Frederick") – (collectively the "Defendants"). The motion relates to claims 1, 2, 3, and 11 of the '114 patent which the Plaintiff Fisher-Barton Blades, Inc. ("Fisher-Barton"), alleges have been infringed by the Defendants.

In prior decisions in this action, the Court construed disputed claim terms and denied the Defendants' motion for summary judgment of invalidity of U.S. Patent No. 5,899,052 ("'052 patent"). The '114 patent and the '052 patent are closely related because they originated in a single application and have substantively identical specifications. *See Fisher-Barton Blades, Inc. v. Blount, Inc.*, No. 05-C-460, 2008 WL 906125, at *1 n.1 (E.D.

Wis. March 31, 2008). The "product" claims are contained in the '052 patent and the "process" claims are contained in the '114 patent. *Id.*[1]

By their motion for summary judgment dismissing Fisher-Barton's infringement claims relating to the '114 patent, the Defendants contend that Fisher-Barton cannot show infringement of the patent because there is no direct infringer. They also maintain that the heat-treating process used by Superior Metal Treating & Equipment ("Superior"), Frederick's heat-treating vendor, is not an austemper[2] and thus does not infringe the asserted '114 patent claims. Additionally, the Defendants argue that the asserted '114 patent claims are invalid because they are obvious and anticipated in light of the 1990-91 ASM *Handbook*.

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[1] Additional references to the procedural history of this action will only be made as relevant to this Decision and Order. The March 31, 2008, Decision and Order denying the Defendants' motion for summary judgment of invalidity as to the '052 patent details the history preceding the issuance of that decision. *See Fisher-Barton Blades, Inc.*, 2008 WL 906125, at *1.

[2]The American Society for Metals ("ASM") International's *Metal Handbook* (1991) ("*Handbook II*") defines "austempering" as "the isothermal transformation of a ferrous alloy at a temperature below that of pearlite formation and above that of martensite formation." (Citations omitted). An ''isothermal transformation" is "[a]ny transformation of a substance which takes place at a constant temperature." *McGraw-Hill Dictionary of Scientific and Technical Terms*, 1127 (6th ed. 2003).

The *Handbook II* states that steel is austempered by being:

> heated to a temperature within the austenizing range, usually 790° to 915° C (1450° to 1675° F); quenched in a bath maintained at a constant temperature, usually in the range of 260° to 400° C (500° to 750° F); allowed to transform isothermally to bainite in this bath; and, cooled to room temperature.

(*See* Court's October 19, 2006, Decision and Order (construing disputed claim terms) 10.)

Martensite is a generic term for the microstructure formed by diffusionless phase transformation in which the parent and product phases have a specific crystallographic relationship. (Court's October 19, 2006, Decision and Order 10 n.5 (citing George Krauss, *Steels: Heat Treatment and Processing Principles* 462 (ASM Int'l 1990).) Pearlite is a higher temperature transformation product. (Court's October 19, 2006, Decision and Order 10 n.4 (citing Krauss, *Steels: Heat Treatment and Processing Principles* 267).) Bainite is a transformation product that may form just above M_s. (*Id.* at 10 n. 6 (citing Krauss, *Steels: Heat Treatment and Processing Principles* 267).)

Fisher-Barton opposes summary judgment contending that there are disputed issues of material fact with respect to nearly every issue raised by the Defendants. Fisher-Barton states that the subcontracting of the heat-treating step does not shield the Defendants from liability for infringement. Fisher-Barton also maintains that the Defendants' rotary cutting blades are austempered and infringe upon independent claim 1, and dependent claims 2 and 3, that the Defendants' process is the equivalent of the process claimed in claim 11. Fisher-Barton further maintains that the processes claimed in the '114 patent are neither obvious nor anticipated.

SUMMARY JUDGMENT STANDARD

When considering a motion for summary judgment, summary judgment "shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with affidavits, if any, show that there is no genuine issue of material fact and that the moving party is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c); *see also, Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986); *Celotex Corp. v. Catrett*, 477 U.S. 317, 324 (1986). In making this determination, "[t]he evidence of the non-movant is to be believed, and all justifiable inferences are to be drawn in [the non-movant's] favor. *See Anderson*, 477 U.S. at 255.

"Material facts" are those facts that under the applicable substantive law "might affect the outcome of the suit." *See id.* at 248. A dispute over "material facts" is "genuine" if "the evidence is such that a reasonable jury could return a verdict for the nonmoving party."

Id. The burden of showing the needlessness of a trial – (1) the absence of a genuine issue of material fact and (2) an entitlement to judgment as a matter of law – is upon the movant. In determining whether a genuine issue of material fact exists, the Court must consider the evidence in the light most favorable to the nonmoving party. *Matsushita Elec. Indus. Co., Ltd. v. Zenith Radio Corp.*, 475 U.S. 574, 587 (1986).

"In rendering a decision on a motion for summary judgment, a court must 'view the evidence presented through the prism of the substantive evidentiary burden' that would inhere at trial." *Monarch Knitting Mach. Corp. v. Sulzer Morat Gmbh*, 139 F.3d 877, 880 (Fed.Cir. 1998) (quoting *Anderson*, 477 U.S. at 254). Infringement, whether literal or under the doctrine of equivalence, must be proven by the preponderance of the evidence. *AquaTex Indus., Inc. v. Techniche Solutions*, 479 F.3d 1320, 1328 (Fed. Cir. 2007); *Warner-Lambert Co. v. Teva Pharm. USA, Inc.*,418 F.3d 1326, 1341 n.15 (Fed. Cir. 2005). Proof by a preponderance of the evidence "simply requires proving that infringement was more likely than not to have occurred." *Warner-Lambert Co.*,418 F.3d at 1341 n.15.

Summary judgment of invalidity, however, must be predicated on facts established by clear and convincing evidence. *Rockwell Int'l Corp. v. United States*, 147 F.3d 1358, 1362 (Fed. Cir. 1998). The clear-and-convincing evidence standard requires that the party with the burden of proof place "in the ultimate factfinder an abiding conviction that the truth of its factual contentions are 'highly probable.'" *Colorado v. New Mexico*, 467 U.S. 310, 316 (1984) (citing C. McCormick, *Law of Evidence* § 320, 679 (1954)). "This would be true, of course, only if the material it offered instantly tilted the evidentiary scales in the affirmative

when weighed against the evidence offered in opposition." *Id.* (citing McBaine, *Burden of Proof: Degrees of Belief*, 32 Calif. L. Rev. 242, 251-54 (1944)).

RELEVANT FACTS[3]

I. General Facts

In this lawsuit, Fisher-Barton asserts that the Defendants infringe four claims of the '114 patent: claims 1, 2, 3, and 11. Claims 1 and 11 are independent claims. Claims 2 and 3 are dependent claims of claim 1.

The '114 patent, filed on September 21, 1995, discloses a process for making boron steel rotary cutting blades with at least 48 Rockwell Scale Hardness and at least 15 ft. lb toughness.[4] The language of claim 1, 2, 3, and 11 is set forth in the chart below, separated by claim elements. The Court's relevant claim constructions appear in the chart in brackets.

Fisher-Barton '114 Patent
1. [a] A process for forming a rotary cutting blade, comprising the steps of
[b] a) working a blank of boron steel to have a beveled cutting edge; and

[3]Unless otherwise stated, the relevant facts are based on the Defendants' proposed findings of fact ("Defs.' PFOF") and Fisher-Barton's additional proposed findings of fact ("Pl.'s PFOF"). Citations to quoted excerpts are included even if they are undisputed.

The Defendants' proposed findings of fact express all temperatures in degrees Fahrenheit. Consequently, with the exception of quoted material from other sources, this Decision and Order expresses temperatures in degrees Fahrenheit.

[4]The parties agreed that the '114 patent would be incorporated by reference. (*See* Defs.' PFOF ¶ 1; Pl.'s Resp. Defs.' PFOF ¶ 1.) However, the entire patent is not placed in issue by the Defendants' motion for summary judgment. Therefore, that agreed proposed finding of fact has not been included in the statement of relevant facts.

[c] b) heat-treating the formed blank to elevate the blank hardness to between 48 and 55 on the Rockwell Hardness Scale[5]
[d] to thereby form a rotary cutting blade having a Charpy Notch toughness [6]of at least 15 ft. lb,
[e] wherein the heat-treating step comprises austempering the formed blank. ["austempering" means: quenched in a bath maintained at a constant temperature, usually in the range of . . . 500° to 750°F; allowed to transform isothermally to bainite in this bath; and, cooled to room temperature.]
2. The process of claim **1**, wherein the working step comprises cold-forming the blank of boron steel.
3. The process of claim **1** wherein the blank is formed of a steel selected from the group consisting of 10B36, 10B37, 10B38, 10B39, 10B40, 10B41, and 10B42 steel.
11. [a] A process for forming a rotary cutting blade, comprising the steps of:
[b] a) working a blank of boron steel to have a beveled cutting edge; and,
[c] b) heat treating the formed blank to elevate the blank hardness to between 48 and 55 on the Rockwell Hardness Scale, wherein the heat-treating step comprises
[d] heating the blank to approximately 1560° F; [1550°to 1610° F[7]]

[5]"Hardness is measured on the Rockwell C Hardness Scale and is a good measure of a material's resistence to wear." ('114 patent, 3:1-4.)

[6]With respect to Charpy notch toughness, this Court stated:

> The ASM *Handbook* explains that "toughness is an indication of the capacity of steel to absorb energy and is dependent upon strength as well as ductility." (Krauss Decl. ¶ 14, Ex. B 739). "Notch toughness" is "an indication of the capacity of steel to absorb energy when a stress concentrator or notch is present." (*Id*.)
>
> The *Handbook* states that a number of notched impact tests have been developed to screen and rate steel product toughness on a relative basis and to determine the ductile to brittle transition for a specific carbon or high-strength low-alloy ("HSLA"). (*Id*.) The most widely used notched impact test is the Charpy V-notch test which is ASTM [American Society for Testing and Materials] specification E 23. (*Id*.)

Fisher-Barton, 2008 WL 906125, at *4 n.16. The '114 patent explains that toughness is "a good indication of how the material [will] react to impact, in particular giving a reading on the material's tendency to fracture or crack." ('114 patent, 3:5-8.)

[7]"The term 'approximately' in claims 8 and 11 of the '114 patent means plus or minus 5° F to 10° F." (Court's October 19, 2006, Decision and Order 21-22.)

[e] quenching the heated blank into a liquid salt bath at approximately 500°F [490° to 510° F[8]] for about 20 minutes [15 to 20 minutes[9]];
[f] and withdrawing the quenched blank from the salt bath and allowing to air cool to room temperature.

Defendant Frederick's heat treater, Superior, performs the process accused of infringing the '114 patent. The steps in the process used by Superior to treat the accused blades are:

Superior Metal Process
Step 1: Blades are placed in a wash tank to remove oils remaining from the drawing process for 400 seconds.
Step 2: Blades are pre-heated to 750° F for 400 seconds.
Step 3: Blades are heated to between 1550°and 1600° F in a salt solution for 400 seconds.
Step 4: Blades are quenched in a first salt solution bath of between 375°and 425°F for 400 seconds.
Step 5: Blades are placed in a second salt solution bath and heated to between 525°and 575°F for 400 seconds.
Step 6: Blades are held in the second salt solution bath for a second 400 second cycle.
Step 7: Blades are rapidly quenched in water at room temperature for 400 seconds.
Step 8: Blades are spray rinsed for 400 seconds.
Step 9: Blades are placed in a rust inhibitor tank for 400 seconds.
Step 10: Blades are air dried at room temperature for 400 seconds.

[8] *Id*.

[9] *Id*. at 22.

II. Single Entity that Both Makes Boron Steel Blades and Heat-Treats the Blades to HRC [Rockwell C Hardness] 48-52 or Toughness of at Least 15 Ft. Lb

The four asserted claims of the '114 process all require a "heat-treating" step. None of the Defendants in this case perform the heat treating of the blades at issue. Superior, which has no corporate affiliation with any of the Defendants, performs the heat-treating of the rotary cutting blades at issue. Superior is an independent entity and is not controlled or owned by any of the Defendants.[10]

III. Nature of Superior Metals' Process: Is It An Austemper?

During the claim term construction proceedings in this case, Fisher-Barton argued, and this Court agreed, that "austempering" as used in the '114 patent had no special meaning and should be defined using the standard definition in the ASM *Handbook*, which is widely used by heat treaters. Relying upon the *Handbook's* definition, the Court construed "austempering to mean a process in which a blade is "heated to a temperature within the austenizing range, usually 790° to 915° C (1450° to 1675° F); quenched in a bath maintained at a constant temperature, usually in the range of 260° to 400° C (500° to 750° F); allowed to transform isothermally to bainite in this bath; and, cooled to room temperature." (Defs.' PFOF ¶ 8; Pl.'s Resp. PFOF ¶ 8.)

Darrell Turner ("Turner"), inventor of the '114 patent, vice-president of engineering at Fisher-Barton, and Fisher-Barton's Rule 30(b)(6) witness regarding infringement issues, testified that isothermal transformation of the blades to bainite, as

[10]There is a genuine dispute of material fact regarding the extent to which Superior controls the heat-treating process and the extent to which the Defendants control that process. (See Defs.' PFOF ¶ 6; Pl.'s Resp. PFOF ¶ 6.)

required by both the *Handbook* and the '114 patent, is a transformation to a "predominately bainitic microstructure," not the formation of a microstructure that contains a some small amount of bainite. (Mansfield Decl. ¶ 2, Ex. A (Turner Dep., Feb. 17, 2007) 64:16-65:04; 159:23-160:05.)

Turner also clarified that "predominately bainitic microstructure" meant that a microstructure was composed of at least 80% bainite. He further testified that, based upon the work of Quentin D. Mehrkam ("Mehrkam"), a microstructure of 50% bainite and 50% martensite would be consistent with an austempering process.[11]

There is a genuine dispute between the parties regarding whether Superior's process transforms the Defendants' blades into a predominately bainitic microstructure. (*Compare* Defs.' PFOF ¶¶ 11-16; Pl.'s Resp. Defs.' PFOF ¶¶ 11-16.) Each party relies upon the analysis of the microstructure of the blades of its respective expert. The Defendants rely upon Krauss's[12] opinion and Fisher-Barton relies upon the opinion of John Perepezko, Ph.D. ("Perepezko").[13] Perepezko asserts that because Krauss micrographed the tips of the

[11]Krauss knows Mehrkam personally through meetings as someone specializing in physical metallurgical steels and heat treatment of steels. (Miota Decl. ¶ 12, Ex. K (Krauss Dep., Dec. 19-20, 2007) 22:15-25.) Krauss has heard Mehrkam's talks about the "various interruption quenching techniques." (Miota Decl. ¶ 12, Ex. K 22:15-20.)

[12]Since 1997, Krauss has been a university emeritus professor of the Colorado School of Mines. (Krauss Decl. ¶ 1.) He holds a Ph.D. and a M.S. from Massachusetts Institute of Technology in Metallurgy, and a B.S. from Lehigh University in Metallurgical Engineering. (*Id*. at ¶ 1.) He has a considerable list of professional positions, achievements, honors and awards, including having authored or co-authored over 300 articles and having authored, coauthored, or edited 12 books related to the metallurgy of steels, heat treating, and/or tools used for metal fabrication. (*Id*. at ¶ 2 & Ex. 2.) He is also the co-inventor on three U.S. patents. (*Id*.)

[13]Perepezko is currently the IBM-Bascom professor of the University of Wisconsin-Madison, Department of Metallurgical Engineering. (Miota Decl. ¶ 13, Ex. L (Perepezko Report Oct. 30, 2007) ¶ 2, Ex. A (Qualifications and Publications).) He has a Ph.D. from Carnegie-Mellon University, and a M.Sc. and B.Sc. from Polytechnic Institute of New York. (*Id*.) He has a considerable list of professional positions, honors and awards. (*Id*.) He has authored or co-authored over 300 articles, and is the inventor on eight patents, one patent application and one patent disclosure. (*Id*.)

Defendants' blades, Krauss's micrographs are not representative samples of a blade for purposes of showing what heat treatment was used. (*See* Perepezko Decl. ¶¶ 9-13 Mar. 3, 2008.) It is undisputed that the tips of the Defendants' blades after being heat-treated by Superior have a different microstructure than the rest of the Defendants' blades. (Defs.' Corrected Reply to Resp. ¶ 11.)

Bainite and martensite are formed in significantly different ways. Martensite is formed through a rapid shear process. Bainite is formed through a longer isothermal hold that allows for complete transformation to bainite.

2. Superior Metals' Process – Isothermal Hold at or Above the Martensite Start Temperature (M_s)

There is a genuine dispute of material fact between the parties regarding whether a person of ordinary skill in the art would understand that the isothermal hold in an austempering process is at or above the martensite start temperature ("M_s"). (*Compare* Defs.' PFOF ¶ 20; Pl.'s Resp. Defs.' PFOF ¶ 20.)

Turner explained that the '114 patent claims are consistent with the definitions of the *Handbook*. There is a dispute between the parties as to whether Superior austempers the accused blades. (*Compare* Defs.' PFOF ¶¶ 29 & 31; Pl.'s Resp. Defs.' PFOF ¶¶ 29 & 31.) Turner testified that the blades must be held at a temperature at or above the M_s temperature for austempering to occur.[14] Superior's quench bath is between 375° and 425° F. A quench

[14]There is a genuine dispute of material fact regarding the M_s temperature for the 10B38 steel used in the Superior's process. (*Compare* Defs.' PFOF ¶ 22; Pl.'s Resp. Defs.' PFOF ¶ 22.) Krauss calculated that the M_s temperature for the 10B38 steel used in Superior metals process is 671° F. (Krauss Decl. ¶ 13.) Perepezko calculated the M_s temperature for that steel is 634° F. (Miota Decl. ¶ 5, Ex. D (Perepezko Report, May 11, 2007) ¶ 5.)

bath of between 375° and 425° F is different than a quench bath of at least 671° F. The second bath temperature in Superior's quench process is between 525° and 575°F, which is below the M_s.

It is undisputed that the initial quench used by Superior is below M_s. It is undisputed that the "Modified Austempering" section of the *Handbook* does not describe Superior's process.

Glen True ("True"), Superior's owner, testified that the Defendants' blades reach the bath temperature during the heat-treatment process. The relevant point is how quickly the blades reach bath temperature. (*See* Pl.'s Resp. Defs.' PFOF ¶ 25; Defs.' Corrected Reply Resp. ¶ 25.)

B. Superior's process does not have the specific austempering steps of claim 11

Element [e] of claim 11 of the '114 patent "quenching the heated blank into a liquid salt bath at approximately 500° F," was construed by the Court to mean 490° to 510° F, and "for about 20 minutes," was construed by the Court to mean 15 to 20 minutes. There is no dispute that the process used to heat treat the Defendants' blades does not literally have such steps.

A person of ordinary skill in the art would know that "quenching" is a cooling process. In other words, quenching is a process in which the temperature of an object is lowered. However, Fisher-Barton asserts that a person of ordinary skill in the art of the '114 patent would also know, as is made clear in the Mehrkam article, that two baths could be used for an austemper, one to lower the temperature of the part, the other to allow isothermal

transformation. (Miota Decl. ¶¶ 5-6,10, Ex. I (Mehrkam, *Austempering in Actual Practice*, METAL PROGRESS, Oct. 1964, Ajax Reprint No. 178) 2, Ex. D ¶¶ 3-6, Ex. E (Turner Report May 14, 2007) 5-8.)[15]

2. Superior Metals' Process - Air Cool to Room Temperature

"Withdrawing the quenched blank from the salt bath and allowing it to air cool to room temperature" is considered by a person of ordinary skill in the art to be a slow cooling process. In step 7 of Superior's process, the blades are quenched to room temperature in water, rather than air. Quenching in water is considered to be a rapid cooling process by a person of ordinary skill in the art. Superior's process does not literally air cool.[16]

IV. Obviousness and Anticipation of Claims 1, 2, 3, and 11 in Light of the 1990-91 *Handbook*

The parties' experts have provided the following descriptions of a person of ordinary skill in the art:[17]

[15]There are genuine disputes of material fact regarding whether the two bath process is the equivalent of the quenching process claimed in element [e] of claim 11 and whether regarding the microstructure is martensite as asserted by the Defendants. (*Compare* Defs.' PFOF ¶¶ 35-38; Pl.'s Resp. Defs.' PFOF ¶¶ 35-38.)

[16]There are genuine disputes of material fact regarding whether a person of ordinary skill in the art of the '114 patent would consider air quenching to be "substantially different" from water quenching. (*Compare* Defs.' PFOF ¶ 41; Pl.'s Resp. Defs.' PFOF ¶ 41.)

[17]Paragraph 42 of the Defendants' proposed findings of fact and the Plaintiff's Response to that proposed finding of fact refer to the '052 patent, rather than the '114 patent. The Court has corrected the error.

There is a genuine dispute of material fact between the parties regarding whether a person of ordinary skill in the art of the '114 patent would have industry experience in the development of rotary cutting blades. (*See* Defs.' PFOF ¶¶ 42-43; Pl.'s Resp. PFOF ¶¶ 42-43.)

Fisher-Barton's Expert Perepezko	**Defendants' Expert Krauss**
A person of ordinary skill in the art of the '114 patent would have an undergraduate degree in material science in metallurgical engineering, materials science or a related field plus two or more years of experience working in industry with responsibility in relation to the heat treatment of rotary cutting blades.	A person of ordinary skill in the art of the '114 patent would have either an undergraduate degree in material science in metallurgical engineering, materials science or a related field plus two or more years of experience gaining practical experience in heat treating steel to achieve particular characteristics, or would have several years of hands-on experience and be associated with professional societies such as the ASM International.

2. Scope of the prior art and differences between the prior art and patent claims

a. *Independent Claim 1*

(i.) [a] A process for forming a rotary cutting blade, comprising the steps of [b] a) working a blank of boron steel to have a beveled cutting edge; and [c] b) heat-treating the formed blank to elevate the blank hardness to between 48 and 55 on the Rockwell Hardness Scale [d] to thereby form a rotary cutting blade having a Charpy Notch toughness of at least 15 ft. lb.

A genuine dispute of material fact exists between the parties regarding whether the blade elements of claim 1, including elements [a], [b], [c], and [d] were known to a person of ordinary skill in the art well before 1995, the year in which the '114 patent application was filed. There is a genuine dispute of material fact between the parties regarding whether the *Handbook* "teaches away" from using boron steel as it is used in the '114 patent. (*See* Defs.' PFOF ¶¶ 45-47; Pl.'s Resp. PFOF ¶¶ 45-47.)

(ii) "[b] a) working a blank of boron steel to have a beveled cutting edge."

It was well-known to persons of ordinary skill in the art decades before the invention of the '114 patent that a steel blade could be made with a beveled edge. Prior art submitted by Fisher-Barton to the U.S. Patent and Trademark Office ("PTO") included several pictures showing blades with beveled edges. One picture entitled "International Standard – ISO·5718-2:1991(E) – Harvesting equipment – Flat blades for rotary mowers," shows a blade with a beveled cutting edge. (Krauss Decl. ¶ 22, Ex. C.) A person of ordinary skill in the art at the time of the invention would have known that the edge was derived by working a steel blank.

(iii) "[e] wherein the heat-treating step comprises austempering the formed blank."

Element [e] of claim 1 of the '114 patent requires a heat-treating process of "austempering." Austempering has been present in the prior art since at least the 1930's.[18] Perepezko testified that it was known in the prior art that austempering was generally known to be useful for both hardness and toughness in lawnmower blades. Attached to Perepezko's expert report is an article by Mehrkam, published in June of 1969, entitled "*Salt Bath Austempering and Martempering*." The Mehrkam article disclosed more than once that lawnmower blades are one of the applications of the austempering heat process. It states:

> A lawn mower blade that requires a hardness of Rockwell C46-48 would be austempered to give it

[18]Genuine disputes of material fact exist between the parties regarding whether the *Handbook* teaches away from using boron steel as it is used in the '114 patent (See Defs.' PFOF ¶¶ 52, 54-55; Pl.'s Resp. PFOF ¶¶ 52, 54-55), and whether the lawnmower blade disclosed in Table 5 of the "Austempering of Steel" article in Volume 4 of the *Handbook* is a rotary cutting blade. (See Defs.' PFOF ¶¶ 51, 53; Pl.'s Resp. PFOF ¶¶ 51, 53.)

> greater toughness than is attainable with martempering.
>
> * * *
>
> Reel type lawn mowers, too, are now being austempered . . . *Austempering not only provides the critical combination of hardness and toughness required* but eliminates the need for straightening. Heat treated to Rockwell C47-52, the blades can be bent into a horseshoe shape without cracking.

(emphasis added). (Mansfield Decl. ¶ 5, Ex. D (Mehrkam, *Salt Bath Austempering and Martempering*, MACHINERY, 72, 76 (June 1969)).)[19]

Based on the text of the second quoted paragraph of the Mehrkam article, Perepezko acknowledged that a person of ordinary skill in the art may "consider" austempering to achieve the desired characteristics, but that such person would also consider the full requirements and "realize that it's not transferable [to rotary cutting blades]." (Miota Decl. ¶ 14, Ex. M (Perepezko Dep., Dec. 19, 2007) 69:25-70:7.) Perepezko has further stated that "austempering was well known in the art" as a way to achieve hardness and toughness "back in 1933 with the original patent by Bain and Davenport." (Mansfield Decl. ¶ 6, Ex. E (Perepezko Dep., Dec. 19, 2007) 69:03-71:02.)

b. Dependent Claim 2: "The process of claim 1, wherein the working step comprises cold-forming the blank of boron steel."

The cold-forming process has been well known to heat treaters since the early twentieth century, particularly to persons of skill in the art with experience with lawnmower blades. "Further, adding this well known cold-forming step to the obvious process of claim 1 of the '114 patent would be obvious." (Defs.' PFOF ¶ 59; Pl.'s Resp. PFOF ¶ 59.)

[19]The quoted portion of the Mehrkam article does not concern boron steel or rotary cutting blades.

c. Dependent Claim 3: "The process of claim 1 wherein the blank is formed of a steel selected from the group consisting of 10B36, 10B37, 10B38, 10B39, 10B40, 10B41, and 10B42 steel."

There is a genuine dispute of material fact between the parties regarding whether it would have been obvious to a person skilled in the art of the '114 patent to use low to medium boron steel instead of low to medium carbon plain steels to achieve the objectives of the '114 patent. (Defs.' PFOF ¶ 60; Pl's Resp. PFOF ¶ 60.)

d. Independent Claim 11:

i. [a] "A process for forming a rotary cutting blade, comprising the steps of: [b] a) working a blank of boron steel to have a beveled cutting edge; and, [c] b) heat treating the formed blank to elevate the blank hardness to between 48 and 55 on the Rockwell Hardness Scale."

Genuine issues of material fact exist between the parties regarding whether elements [a], [b], and [c] were obvious or anticipated by the *Handbook* or prior art. (Defs.' PFOF ¶ 61; Pl.'s Resp. PFOF ¶ 61.)

ii. "wherein the heat-treating step comprises [d] heating the blank to approximately 1560° F; [1550 ° F to 1610° F] [e] quenching the heated blank into a liquid salt bath at approximately 500°F [490° F to 510° F] for about 20 minutes [15 to 20 minutes]; [f] and withdrawing the quenched blank from the salt bath and allowing to air cool to room temperature.

The heat treatment claimed in claim 11 of the '114 patent is one wherein cooling from austenizing temperatures (*e.g.* approximately 1560° F) is interrupted for a period (*e.g.* about 20 minutes) in which the piece is quenched. These treatments are best applied to thin section parts made from steel with good hardenability, and have long been known to provide

improved toughness, increased "CVN" [Charpy V-Notch][20] energy, reduced distortion, and reduced residual stresses in hardened steel parts. (Defs.' PFOF ¶ 62.)

In claim 11, hardness of between 48 and 55 on the Rockwell Hardness Scale is the only characteristic sought in the part. When quenching carbon steel pieces of the size of the rotary cutting blades claimed in the '114 patent, hardness is inversely proportional to the quench bath temperature. In other words, quenching at a lower temperature will result in higher hardness, and visa-versa. This principle has been known for decades.

A person of ordinary skill in the art would know that the longer the quench bath, the more of a tempering effect the quench would have on the martensite. Further, a person of ordinary skill in the art would know that this would increase the toughness of the object. It would have been obvious to a person at the time of the invention to try several quench periods, including particularly times as long as 20 minutes, to achieve a generally higher toughness.

FISHER-BARTON'S ADDITIONAL PROPOSED FINDINGS OF FACT

This Court's definition of austempering, which follows the *Handbook*, is qualified by "usually" and ranges because of the wide variety of heat treatments that are characterized as austempering under the ASM. The *Handbook* article (the definition's source) further states:

> It is more important that austempered parts possess desired mechanical properties than that they have 100% bainitic structure. From Table 3, it is evident that several of the austempered steels have mixed

[20] *See* http://acronyms.thefreedictionary.com/CVN (last visited Sept. 4, 2008).

> structures. Higher-than-normal hardness indicates that some martensite has formed, and below-normal hardness indicates the presence of some pearlite. The formation of pearlite is more common and results from a quenching speed to slow for complete avoidance of the nose of the TTT [time-temperature transformation] curve.
>
> In industrial practice, a sizable percentage of applications are successful with less than 100% bainite. In fact, 85% bainite has been found satisfactory for some applications. Obviously, austempering is often "modified" to some degree in commercial application, and whether or not the metallurgical properties obtained conform to those obtained in true austempering is at least partially ignored if the treated parts meet service requirements.

(Miota Decl. ¶ 8, Ex. G. [4 *Handbook* 155-56].)

Krauss's micrographs were limited to the tips of the blades. The rotary blades tips are not representative of the metallurgical structure of the entire blade for the purpose of showing the heat treatment that was used. (Perepezko Decl. ¶ 8.) First, "the tips of the blade are the thinnest structure of the blade and would not be representative of the heat treating of the entire blade." (Perepezko Decl. ¶ 9.) Additionally, the tips of the blades necessarily have a different steel structure than the rest of the blade because of the metallurgical effects of sharpening and the subsequent heat treatment. (Perepezko Decl. ¶ 10.) The Defendants' blades are sharpened before they are heat treated and because of the friction of sharpening, some heating and decarburization (removal of carbon) occurs at the tips. (Perepezko Decl. ¶ 11.) That decarburization, in combination with further decarburization caused by how heat treatment effects the now thinner cross section at the edge, leads to different effects of the

austempering process on those tips. (Perepezko Decl. ¶ 11.) Therefore, "a microscopic examination of the tips is not representative of the effect of austempering on the whole blade." (Perepezko Decl. ¶ 11.) Thus, Perepezko opines that an examination of the tips does not provide one of ordinary skill in the art with the information necessary to determine the type of heat treatment to which the blade was subjected. (Perepezko Decl. ¶ 11.) Perepezko further concluded that even the micrograph submitted by Krauss is inconclusive as to whether the tip is predominantly bainitic. (Perepezko Decl. ¶ 7.)

Perepezko also examined scanning electron micrographs of the center section of Fisher-Barton's product – produced using an austempering – and micrographs of a similar center section of the Defendants' accused product. (Perepezko Decl. ¶ 12-13.) He concludes that "[b]oth show a primarily bainitic structure, and indicate . . . that both blades had undergone a substantially identical heat treatment. That heat treatment was an austempering." (Perepezko Decl. ¶ 20.)

The Defendants and Krauss, deny that the heat treating process Superior uses is an austemper. However, Superior's oven is set at the austemper mode.

Mehrkam contributed to the *Handbook*. Mehrkam's company, Ajax Electric Co. ("Ajax"), manufactures the ovens used by Superior. As Mehrkam appreciates, an initial lower temperature quench followed by a second transformation bath is still austempering as understood by the ASM. (Miota Decl. ¶ 10, Ex. I (Mehrkam, *Austempering in Actual Practice*, METAL PROGRESS (October 1964) Ajax Reprint No. 178, 2).)

Perepezko provided the following explanation of the bath in his report:

> When the isothermal transformation temperature is below the M_s, some amount of martensite will form. The formation of martensite is an athermal reaction that does not depend on the amount of time at the isothermal holding temperature. However, the amount of martensite in the microstructure does depend on the level at which the holding temperature is below the M_s. With continued holding time below the M_s, additional martensite does not form, but bainite which is the product of a thermally activated, diffusion-controlled reaction can develop in the microstructure. Moreover, with continued holding at an isothermal temperature, the martensite that formed initially will undergo a tempering process that results in the formation of fine scale carbide precipitates within the martensite. A person skilled in the art would not understand the explanation of austempering in the . . . *Handbook* or in the Court[']s definition to teach that a part microstructure must be comprised of 100% bainite to exhibit the mechanical properties imparted by an austempering heat treatment. In other words, in the industrial, commercial practice of austempering heat treatments the resulting part will have a mixed microstructure comprising bainite and martensite that is tempered to provide a functional performance.

(Miota Decl. ¶ 5, Ex D. ¶ 4.)

The process in the '114 patent is an austemper. Perepezko explained:

> As described in one embodiment of the [']114 patent the austempering process involves heating to approximately 1560° F and then quenching into a liquid salt bath at approximately 500° F for about 20 minutes. The quenched blades are then withdrawn from the salt bath and allowed to air cool to room temperature. In terms of the . . .

> *Handbook* description of austempering the heat treating steps and temperatures in the [']114 patent fall within the stated requirements in a literal sense.

(Miota Decl. ¶ 5, Ex D. ¶ 5.)

Perepezko opines that even Krauss's assumptions support the fact that there is a substantial transformation to bainite in the patented process. (Miota Decl. ¶ 5, Ex D. ¶ 5.) Perepezko states:

> However, as is well known in the art, the quenching rate of a part decreases as the part temperature approaches the quench bath temperature. Indeed, . . . Krauss noted this fact in his declaration on page 2 where it is stated, "When the Frederick blades are quenched in the first bath after austenizing, they reach the bath temperature of 375°-425°in a very short time, i.e. within a matter of minutes." A period of several minutes is sufficient during the quenching of steel to allow for the formation of some bainite before the temperature of the steel is lowered to the M_s. The amount of bainite that forms during cooling until the M_s is reached can not [sic] be determined without the actual cooling history. However if the amount of prior bainite is 10% then the calculation would indicate that f_M is reduced to 50%. Therefore the calculated f_M of 56% is an upper bound estimate on the actual amount of martensite present. With continued isothermal holding in the quench bath at 500° F additional martensite will not form, but the initially formed martensite will be tempered. The remaining austensite in the steel will transform to a substantial amount of bainite comprising at least 44% of the microstructure. The resulting mixed microstructure of tempered martensite and bainite is consistent with the industrial practice of austempering as explained in the . . . *Handbook.*

(Miota Decl. ¶ 5, Ex D. ¶ 5.)

During the initial quench, the Defendants' blades are cooling from the austenizing temperature *over time* and thus bainite is formed in this step. According to Perepezko, during the second bath, even though the temperature of that bath is below the M_s, no new martensite will be formed. Instead, the martensite that formed in the first bath will be tempered and the remaining austenite in the steel will transform to bainite. This is the process described by Mehrkam. Perepezko concludes:

> The steel microstructure that results from the [Defendants'] process is a mixed microstructure of tempered martensite and bainite. The austempering heat treatment in claim 1 of the ['] 114 patent and that practiced by the Frederick process both yield a mixed microstructure of tempered martensite and bainite components that meet the service requirements for boron steel.

(Miota Decl. ¶ 5, Ex D. ¶ 6.)

Turner also opines:

> Even if the percentage of bainite compared to martensite is somewhat lower, the resulting blade is functionally and micrographically identical to the blades produced by austempering. I have looked at micrographs of [the Defendants'] blades and there is no discernable difference between those blades and the [Fisher-Barton] blades produced by a process described in the patent.

(Miota Decl. ¶ 6, Ex. E 8.) Turner indicates that the substitution of a two bath method for a one bath method is well known. (Miota Decl. ¶ 6, Ex. E 8.) It was known in 1993 and today that a two-bath system can be used to get the same results as a one-bath system. (Miota Decl.

¶ 6, Ex. E 8.) According to the Ajax sales manager, the two-bath system (or three-step method as it is referred to by Ajax) has been employed in some austemper lines since at least the mid-1950's. (Miota Decl. ¶ 6, Ex. E 8.)

Relying upon his analysis of the microstructure of the Fisher-Barton 10B38 blades and the Defendants' blades as shown in a scanning electron microscope using back - scattered electron (SEM-BSE) imaging, Perepezko opines that metallurgically the result of the Defendants' method is identical to that of the method of claim 11. (Miota Decl. ¶ 5, Ex. D ¶ 11.)

Perepezko also indicates that: (1) there is no meaningful metallurgical distinction between the Defendants' water quench and an air cool at the time it is done in the process; (2) it is a known substitution; and, (3) in any event, the blades are eventually cooled to room temperature in the air not in the water given the bath temperature. (Miota Decl. ¶ 5, Ex. D ¶ 7.)

Mehrkam's 1969 article also states that "[t]he steel is then either air cooled or water quenched, without further structural changes, since the transformation has already been completed." (Miota Decl. ¶ 11, Ex. J 72.) Krauss also testified that "if it's fully transformed, there will be no more microstructural change." (Miota Decl. ¶ 12, Ex. K 114:8-14.)

In metallurgy, it is impressive when someone applies steel with known properties to a new application, particularly when the new application solves a problem that has been confronting a particular industry for some time. In the rotary cutting blade industry,

rotary cutting blades that were above a hardness of Rockwell C were previously considered unsafe due to potential breakage and the Defendants kept their boron steel blades under 45 Rockwell C and did not conduct Charpy V Notch toughness testing. Confronting that problem and solving it by using boron steel coupled with the precise parameters for both hardness and toughness is the type of research and development that is inventive in metallurgy and which moves the field forward.

ANALYSIS

Impact of Superior's Role as the Heat-Treater on the Defendants' Liability

The first issue presented by the Defendants' motion is: what impact, if any, does Superior's role as the heat-treater of the Defendants' blades have on the Defendant' liability for infringement? The parties' briefs focus on *BMC Res. Inc. v. Paymentech, L.P.*, 498 F.3d 1373, 1379 (Fed. Cir. 2007). Subsequently, the parties filed letter briefs addressing the July 14, 2008, *Muniauction, Inc., v. Thomson Corp.*, 532 F.3d 1318 (Fed Cir. 2008), decision.

Superior, an independent entity that is not owned or controlled by any of the Defendants, performs the heat-treatment of the accused blades. Thus, the Defendants do not perform every step of the process.

The parties disagree on the legal import of Superior's role. The Defendants maintain that they are not liable for any infringement of the '114 patent. Fisher-Barton contends that, given the Defendants' specification and direction of the heat-treatment process performed by Superior, the Defendants are liable for infringement of the '114 patent.

The distinction between proof of direct and indirect infringement is explained in *BMC Resources, Inc.*, 498 F.3d at 1378-79, as follows:

> Direct infringement requires a party to perform or use each and every step or element of a claimed method or product. *Warner-Jenkinson Co., Inc. v. Hilton Davis Corp.*, 520 U.S. 17, 117 S.Ct. 1040, 137 L.Ed.2d 146 (1997) (holding that the doctrine of equivalents, like literal infringement, must be tested element by element); *Canton Bio-Med., Inc. v. Integrated Liner Techs., Inc.*, 216 F.3d 1367, 1370 (Fed. Cir. 2000); *Gen. Foods Corp. v. Studiengesellschaft Kohle mbH*, 972 F.2d 1272, 1274 (Fed. Cir. 1992). For process patent or method patent claims, infringement occurs when a party performs all of the steps of the process. *Joy Techs., Inc. v. Flakt, Inc.*, 6 F.3d 770, 773 (Fed. Cir. 1993).
>
> When a defendant participates in or encourages infringement but does not directly infringe a patent, the normal recourse under the law is for the court to apply the standards for liability under indirect infringement. Indirect infringement requires, as a predicate, a finding that some party amongst the accused actors has committed the entire act of direct infringement. *Dynacore Holdings Corp. v. U.S. Philips Corp.*, 363 F.3d 1263, 1272 (Fed. Cir. 2004).

The court observed:

> These rules for vicarious liability might seem to provide a loophole for a party to escape infringement by having a third party carry out one or more of the claimed steps on its behalf. *Cross Med. Prods. v. Medtronic Sofamor Danek*, 424 F.3d 1293, 1311 (Fed. Cir. 2005). To the contrary, the law imposes vicarious liability on a party for the acts of another in circumstances showing that the liable party controlled the conduct of the acting

> party. *Engle v. Dinehart*, 213 F.3d 639 (5th Cir. 2000) (unpublished decision) (citing *Restatement (Second) of Agency* § 220 cmt. d).

BMC Resources, Inc., 498 F.3d at 1379. The court emphasized that "[i]n the context of patent infringement, a defendant cannot thus avoid liability for direct infringement by having someone else carry out one or more of the claimed steps on its behalf. *Id.* *Muniauction, Inc.*, 532 F.3d at 1328-29, reaffirmed the *BMC Resources* holding, and further emphasized the "control and direction" standard of *BMC Resources*.

In this case, the Defendants assert that they do not direct or control Superior's heat treating of the blades. (Defs.' PFOF ¶ 6.) However, they rely on deposition testimony which establishes only that Superior is a separate legal entity. (*See* Mansfield Decl. ¶ 7, Ex. F (True Dep. 7:19-8:09 Sept. 21. 2006).) That testimony does not address the question of whether the Defendants direct or control the heat-treating process. Moreover, Fisher-Barton proffers True's testimony that Frederick directs that the blades meet a certain hardness and Superior hardens them to meet that specification. (*See* Miota Decl. ¶ 3, Ex. B (True Dep. Sept. 21. 2006)14:2-20; 22:20-21; 24:25-25-4.)

The Defendants have not presented evidence showing that they do not control the heat-treating process. Moreover, Fisher-Barton has presented evidence that raises a genuine dispute of material fact regarding whether the heat-treating process is controlled by the Defendants. At this juncture, considering the evidence in the light most favorable to Fisher-Barton, the Defendants have not met their burden of demonstrating that they are not liable for any infringement on the '114 patent.

Infringement

The Defendants next contend that their blades do not infringe upon claims 1, 2, 3, and 11 of the '114 patent. Fisher-Barton asserts that there are disputed issues of material facts which preclude summary judgment on the questions of whether the Defendants' blades infringe the asserted claims. Fisher-Barton argues literal infringement as to claim 1 and dependent claims 2 and 3, and infringement under the doctrine of equivalence as to claim 11.

In evaluating the parties' contentions, the Court notes that patent infringement is a two-step inquiry. First, the Court must construe the asserted claim. *Freedman Seating Co. v. Am. Seating Co.*, 420 F.3d 1350, 1357 (Fed. Cir. 2005)(citing *RF Del., Inc. v. Pac. Keystone Techs., Inc.*, 326 F.3d 1255, 1266 (Fed. Cir. 2003)). Second, the Court must determine whether the accused product or process contains each limitation of the properly construed claims, either literally or by a substantial equivalent. *Id.* The first step is a question of law; the second step is a question of fact. *Id.*; *See also, V-Formation, Inc. v. Benetton Group SpA*, 401 F.3d 1307, 1310 (Fed. Cir. 2005). Therefore, summary judgment of infringement or non-infringement is appropriate "only 'when no reasonable jury could find that every limitation recited in the properly construed claim either is or is not found in the accused device.'" *V-Formation, Inc.*, 401 F.3d at 1310 (citing *Gart v. Logitech, Inc.*, 254 F.3d 1334, 1339 (Fed. Cir. 2001)).

As stated in *Freedman Seating*, 420 F.3d at 1357, "[u]nder the doctrine of equivalents, 'a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is 'equivalence' between the

elements of the accused product or process and the claimed elements of the patented invention.' *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 21 (1997) (citing *Graver Tank Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 609 (1950))." (parallel citations omitted). The doctrine evolved in recognition of the fact that:

> [t]he language in the patent claims may not capture every nuance of the invention or describe with complete precision the range of its novelty. If patents were always interpreted by their literal terms, their value would be greatly diminished. Unimportant and insubstantial substitutes for certain elements could defeat the patent, and its value to inventors could be destroyed by simple acts of copying.

Freedman Seating, 420 F.3d at 1357-58 (quoting *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 731 (2002)). "However, at the same time, the doctrine of equivalents necessarily adds uncertainty to the scope of patent claims, and thereby detracts from the public-notice function of patent claims and risks deterring non-infringing and potentially innovative endeavors." *Freedman Seating*, 420 F.3d at 1358 (citing *Festo*, 535 U.S. at 727).

Freedman Seating, 420 F.3d at 1358, states that, in recognition of this risk and in an effort to strike the proper balance between protecting patentees while also providing sufficient notice to the public, various rules of law have emerged to constrain when and how the doctrine of equivalents is to be applied. One rule is the "all limitations" rule which "holds that an accused product or process is not infringing unless it contains each limitation of the

claim, either literally or by an equivalent." *Id*. (citing *Warner-Jenkinson*, 520 U.S at 29; *Kustom Signals, Inc. v. Applied Concepts, Inc.*, 264 F.3d 1326, 1333 (Fed. Cir. 2001)).

This principle has two primary implications for the doctrine of equivalents. *Freedman Seating*, 420 F.3d at 1358. "First, the all limitations rule requires that equivalence be assessed on a limitation-by-limitation basis, as opposed to from the perspective of the invention as a whole." *Id*. (citing *Warner-Jenkinson*, 520 U.S. at 29). Second, an element of an accused product or process is not, as a matter of law, equivalent to a limitation of the claimed invention if such a finding would entirely vitiate the limitation. *Freedman Seating*, 420 F.3d at 1358.

"There is no set formula for determining whether a finding of equivalence would vitiate a claim limitation, and thereby violate the all limitations rule." *Freedman Seating*, 420 F.3d at 1359. "Rather, courts must consider the totality of the circumstances of each case and determine whether the alleged equivalent can be fairly characterized as an insubstantial change from the claimed subject matter without rendering the pertinent limitation meaningless." *Id*.

Claim 1: Is Heat-Treatment an Austemper?

The Defendants maintain that the process by which Superior heat treats the blades is not an austemper and therefore, it does not infringe claim 1, literally or equivalently. In addressing literal infringement, the Defendants contend that Superior's heat-treating process does not allow the blades to transform predominately to bainite; instead, the blades are transformed primarily to martensite, relying upon Krauss's micrographs of their blades and his analysis of those scanning electron microscope images. They also contend that Superior's

process does not quench at or above the martensite start temperature (M_s), which is essential to cause the isothermal transformation to martensite.

Fisher-Barton counters that the Defendants infringe claim 1 because Superior uses an austemper process to harden the rotary cutting blades. Fisher-Barton states that the Defendants never produced the Krauss micrographs during discovery and that his opinion was revealed for the first time in his declaration supporting summary judgment. Moreover, relying upon Perepezko's opinion, Fisher-Barton asserts that Krauss's opinion is flawed because it is based on his micrographs of the tips of the blades – the thinnest part of the blade which is not representative of the metallurgical structure of the entire structure. Perepezko opines that the blade tips have a different metallurgical structure due to the effects of sharpening, and that blade tips are further effected by decarburization. (*See* Perepezko Decl. ¶¶ 8-11.) As a result, Perepezko maintains that an examination of the tips does not provide one of ordinary skill in the art with the information necessary to determine the type of heat treatment to which the blade was subjected. (Perepezko Decl. ¶ 11.)

Again relying upon Perepezko's opinion, Fisher-Barton maintains that Krauss's micrographs are inconclusive and that Perepezko's analysis of scanning electron micrographs of a center section of a Fisher-Barton's blade, which is indisputably produced using austempering, and a similar center section of the Defendants' accused product "show a primarily bainitic structure, and indicate that to [him] that both blades had undergone a substantially identical heat treatment. That heat treatment was an austempering." (Perepezko Decl. ¶ 21.)

The focus of the parties' claim 1 "austempering" dispute is based on the Court's definition of "austempering" as a process in which a blade is heated to a temperature within the austenizing range, usually 1450° to 1675° F; quenched in a bath maintained at a constant temperature, usually in the range of 500° to 750° F; allowed to transform isothermally to bainite in this bath; and, cooled to room temperature. From this definition, the parties debate the amount of bainite found in the Defendants' blades.

The Defendants contend that the amount of bainite in their blades is undisputed. However, that contention is controverted by the Perepezko Declaration proffered by Fisher-Barton. There is a genuine dispute of material fact regarding the amount of bainite in the Defendants' blades. Considering the evidence in the light most favorable to Fisher-Barton, the Defendants have not established that they are entitled to judgment as a matter of law on the austempering issue.

The Defendants further contend that their blades do not infringe on the claim because Superior's process does not quench at or above the martensite start temperature (M_s) – which they assert is essential to cause the isothermal transformation to bainite. The Defendants argue that although "austempering" as construed by this Court specifies that the isothermal hold must take place in a bath that is "*usually in the range of*" 500° to 750° F, a person of ordinary skill in the art of the '114 patent would understand that such a hold within the range must also be at or above the M_s. (Emphasis added). The Defendants rely on Krauss's opinion that a person of ordinary skill in the art would know that the isothermal hold in an austempering process is at or above M_s. (Krauss Decl. ¶ 13.)

Taking issue with the Defendants' contention, Fisher-Barton relies upon Perepezko's opinion that part temperature not bath temperature is determinant of transformation and that, depending on the cooling curve, a quench at below the M_s will allow for the transformation from austenite to a predominately bainitic microstructure because steel cools over time. (Miota Decl. ¶ 5, Ex. D ¶¶ 3-5.) Perepezko also asserts that the austempering process used by Fisher-Barton quenches the steel at a temperature below the M_s. (Miota Decl. ¶ 5, Ex. D ¶¶ 3-5.) Further, Fisher-Barton proffers Krauss's opinion that: "The key point is that the application of the process described in the claims of the ['114 process produces a largely bainitic microstructure and therefore as stated in claims 1 and 11 is an austempering heat treatment." (Miota Decl. ¶ 12, Ex. K 47:16-23.)

Fisher-Barton also relies upon Mehrkam's description of austempering, in a June 1969 article in *Machinery*, which states:

> When hardenability is a problem a three step method (austenitize, quench, temper) can be employed. In employing this technique, the heat treater quenches the parts in a bath held at a rather low temperature – *usually below the M_s until the temperature is uniform throughout the cross section.* He then transfers the part immediately to a salt bath operating at a higher temperature and hold it until the transformation to bainite is completed.

(Miota Decl. ¶ 5, Ex. D ¶ 3.) (Emphasis added). Construing the evidence in the light most favorable to Fisher-Barton, there are genuine disputes of material fact as to whether a person of ordinary skill in the art would understand that the isothermal hold in an austempering process is at or above the M_s.

Based on the foregoing, the Defendants have not established that as a matter of law their blades do not infringe on claim 1 of the '114 patent. The Court's holding with respect to infringement of claim 1, applies to dependent claims 2 and 3. *See Muniauction, Inc.*, 532 F.3d at 1328 n.5. Therefore, summary judgment on the issue of non-infringement on claims 1, 2 and 3 is denied.

Claim 11: Is Superior's Heat-Treatment the Equivalent of the Claimed Austempering Steps?

The Defendants contend, and Fisher-Barton concedes, that the process used by Superior does not literally practice element [e] of claim 11, which requires "quenching the heated blank into a liquid salt bath at approximately 500°F [construed by this Court as 490° to 510° F[21]] for about 20 minutes [construed by this Court as 15 to 20 minutes]." The issue as to claim 11 is whether the Defendants' process is the equivalent of the claim 11 process.

The Defendants maintain that their process does not infringe on claim 11 because two baths are used during the quenching stage. In addition, they maintain that the blades water cool whereas air cooling is specified by claim 11. The Defendants rely on *Freedman Seating*, 420 F.3d at 1357, in contending that Fisher-Barton's position vitiates a claim element. (Defs.' Reply Br. 10).

Review of *Freedman Seating*, 420 F.3d at 1350, is instructive regarding analysis of infringement under the doctrine of equivalence. Freedman Seating, holder of the '389 patent for a stowable seat, brought an infringement action against a competitor, American

[21] *Id.*

Seating. *Id*. at 1352. American Seating counterclaimed that the patent at issue was invalid. *Id*. at 1351.

Both companies manufactured a stowable seat that can fold away to create more interior space in a vehicle, is particularly useful for accommodating passengers with wheel chairs, and is usable in a public transportation vehicle. *Id*. at 1352-54. Both manufacturers' seats also used a cantilever design to support the seats when they were in a horizontal position. *Id*. at 1353-54.

On summary judgment, the parties agreed that American Seating's accused product met the limitations of Freedman Seating's claim 1 except for the limitation requiring that the movable end of the support member be slidably mounted to the seatbase. *Id*. at 1355. The accused product did not literally meet that limitation because its support member was rotatably mounted to the seat base. *Id*.

American Seating contended that its support member and movable end were not the equivalent to the corresponding structure claimed by '389 patent because its system used a fourth link which created a substantially different support structure than the slider crank of the '389 patent. *Id*. In particular, American Seating argued that the support structures of its device created substantially different distribution forces. *Id*.

On summary judgment, the district court found for Freedman Seating on the issue of infringement under the doctrine of equivalents. *Id*. Concluding that the judgment of infringement under the doctrine of equivalents had the effect of vitiating a limitation of the patent, the Court of Appeals for the Federal Circuit reversed. *Id*. at 1352.

In analyzing the issue of equivalence, the appeals court reviewed its prior decisions on the issue and identified factors relevant to that determination. *Id*. at 1359-61. One factor is whether the difference is "a subtle difference in degree," or "a clear, substantial difference or difference in kind." *Id*. at 1361 (quoting *Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 149 F.3d 1309, 1321 (Fed. Cir. 1998)). Another factor is whether the subject matter claimed by the patent involves relatively simple and well-known technologies. *Freedman Seating*, 420 F.3d at 1362. Additional factors are the specificity and narrowness of the claim, and the foreseeability of the variations at the time of filing the claim with the PTO. *Id*. at 1360.

Addressing the equivalence of American Seating's product, the appeals court held that the district court's finding of infringement had the effect of entirely vitiating the "slidably mounted" limitation. *Id*. at 1361. Specifically, the court stated that while the movable end of the accused device had the ability to rotate, it could not slide or otherwise move along the seat base; instead, it was confined to a fixed location. *Id*. The court stated that the structural difference in the mounting of the movable end to the seatbase was not a "subtle difference in degree," but "a clear, substantial difference in kind." *Id*. (citation omitted.) The court also observed that the subject matter claimed by the '389 patent involved relatively simple and well-known technologies and the patentees stated they were aware of other types of four bar mechanisms. *Id*. at 1362. The court held that since the patentees chose to specifically limit the claims to slider-crank mechanisms vis-a-vis the "slidably mounted" movable end limitation, members of the public were justified in relying on this specific claim

language in assessing the bounds of the claim and that to determine that the claims include the other four bar mechanisms under the doctrine of equivalents would unjustly undermine the reasonable expectations of the public. *Id.*

Fisher-Barton contends that the method used by Superior is the equivalent of the process of claim 11 because rather than having one bath at 490° to 510° F for 15 to 25 minutes, Superior has a slightly lower temperature (375° to 425° F) for 6 b minutes and a slightly higher temperature (525° to 575° F) for 13 a minutes which results in an average temperature of 425° to 525° F for 20 minutes. (Pl.'s Br. Opp'n Summ. J. 19.) Fisher-Barton maintains that by slightly lowering the temperature at the beginning of the quench and then raising it back up, Superior is heat-treating at an average temperature exactly within the range of claim 11.

The equivalence of the two-bath system with that specified by claim 11 is supported by the Turner and Perepezeko reports. Turner states that the two baths do not change the final result, and the way that the Defendants are heat-treating is substantively identical to the way the patent describes. Turner relies upon the information from Ajax that the two-bath, or three-step method as Ajax refers to it, has been in use since at least the mid-1950's and explains how the two-bath system is the functional equivalent of the one-bath method.

Perepezko has compared micrographs of the Defendants' blades and Fisher-Barton's 10B38 blades and finds that their microstructures are indistinguishable. Both the

Defendants' blades and Fisher-Barton's 10B38 blades result in a mixed microstructure of tempered martensite and bainite components.

The evidence presented by Fisher-Barton indicates that the difference between the Defendants' quench process and that specified by claim 11 may be a "subtle difference in degree." The record before the Court also indicates that it was known that a two-bath process could be substituted for a one-bath process indicating that variations were foreseeable when the patent application was filed. However, there was a previously unmet need for rotary cutting blades of high hardness and toughness. At this juncture, when the evidence is viewed in the light most favorable to Fisher-Barton, there is a genuine dispute of material fact regarding the equivalence of the Superior quenching process to that of claim 11 which may not be resolved on summary judgment. *See V-Formation, Inc.*, 401 F.3d at 1310.

A closer question is presented by the Defendants' contention that their heat-treating process is not equivalent to the claim 11 process because it does not air cool; rather, the accused process uses a water cool. Although a finding of equivalence may not vitiate a claim limitation, there is no precise formula for determining whether a finding of equivalence would vitiate a claim limitation. *Freedman Seating*, 420 F.3d at 1359.

Perepezko states that:

> In the Frederick process the boron steel part is quenched in water at room temperature after holding for 400 seconds in the second water bath. In claim 11 the boron steel part is allowed to air cool to room temperature after holding in the isothermal salt quench bath at 500° F for 20 minutes. Since a holding treatment of 400 seconds at 525 to 575° F or 20 minutes at 500°F will

> complete the transformation of austenite to bainite, *the use of a fast water quench or a slower air cool to room temperature will result in a negligible difference in the final mixed microstructure of tempered martensite and bainite.*

(Miota Decl. ¶ 5, Ex. D ¶ 7.) (Emphasis added.) Fisher-Barton's position that the choice of medium for the bath is irrelevant is also supported by Mehrkam's 1969 article, stating that "[t]he steel is then either air cooled or water quenched, without further structural changes, since the transformation has already been completed."

The totality of the circumstances of the case must be considered in determining whether water cooling – the alleged equivalent element – can be fairly characterized as an insubstantial change from the claimed subject matter – air cooling – without rendering the pertinent limitation meaningless. *See Freedman Seating*, 420 F.3d at 1359. Fisher-Barton's evidence indicates that the medium for cooling is irrelevant at that stage of blade processing. The evidence also indicates that water cooling was known when the patent application was filed. Nonetheless, the technology encompassed by claim 11 addressed a previously unsolved problem in the industry.

At this juncture of the proceedings, the Defendants have not established as a matter of law that the difference of air cooling versus water cooling is "a clear, substantial difference or difference in kind." *Id*. at 1360. Thus, while it is a close question, construing the evidence in the light most favorable to Fisher-Barton, the Court concludes that Defendants have not established as a matter of law that water cooling is not the equivalent of air cooling and summary judgment of non-infringement on claim 11 is denied.

Invalidity of '114 Patent Claims: Obviousness and Anticipation by the 1990-91 *Handbook*

In their initial brief, relying on the doctrines of obviousness and anticipation, the Defendants assert that the '114 patent claims are invalid based on the 1990-91 *Handbook*. The Defendants' reply brief does not mention the anticipation argument, but acknowledges that the Court rejected their obviousness argument as to the '052 patent. The reply brief includes a perfunctory argument that disputed facts as to secondary considerations are insufficient to withstand summary judgment. (Defs.' Reply Br. 11-13.)

Fisher-Barton counters that the Defendants merely offer a boilerplate paragraph regarding the law of anticipation which lacks analysis of how each and every limitation of any claim of the '114 patent appears in any prior art reference. It contends that the Defendants' invalidity contention is actually premised on obviousness and that the Defendants have not made that showing because there are genuine disputes of material facts which are relevant to that determination. Further, Fisher-Barton maintains that it has also presented evidence of secondary considerations that are strong indicators that the '114 patent was not obvious.

Anticipation

This Court's March 31, 2008, Decision and Order summarizes the law pertaining to anticipation as follows:

> An invention is anticipated under 35 U.S.C. § 102(b) if it "was . . . patented or described in a printed publication in this . . . country . . . more than one year prior to the date of application for patent in the United States." 35 U.S.C. § 102(b). The first step of an anticipation analysis is claim construction; the second step in the analysis

> involves a comparison of the construed claim to the prior art. *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000).
>
> Anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention. *Apple Computer, Inc. v. Articulate Sys., Inc.*, 234 F.3d 14, 20 (Fed. Cir. 2000). Whether such art is anticipating is a question of fact. *Id*. Summary judgment on invalidity is appropriate when there are no material facts in dispute and the movant has established invalidity by clear and convincing evidence. *Helifix Ltd.*, 208 F.3d at 1346; *Oney v.Ratliff*, 182 F.3d 893, 895 (Fed. Cir. 1999) ("summary judgment is inappropriate if a trier of fact applying the clear and convincing standard could find for either party").
>
> To establish that a claim is anticipated under 35 U.S.C. § 102(b), a party must present clear and convincing evidence that a single piece of prior art reference discloses, either expressly or inherently, each limitation of the claim. *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002). A prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. *Id*. at 1349-50 (citing *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342 (Fed. Cir. 1999); *Titanium Metals Corp. v. Banner*, 778 F.2d 775 (Fed. Cir. 1985)). *See also, Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003).

Fisher-Barton, 2008 WL 906125 at * 7.

The Defendants rely on the arguments that they advanced in contending the '052 patent was anticipated. Absent any new or different arguments regarding anticipation, the Court declines to repeat its analysis of the issue and relies on its reasoning in in its March 31,

2008, Decision and Order to conclude that the Defendants have not established that the asserted claims of '114 patent are invalid as being anticipated by the prior art. *See Fisher-Barton*, 2008 WL 906125 at * 8-9.

Obviousness

This Court's March 31, 2008, Decision and Order, summarizes the law regarding obviousness as follows:

> [A] claimed invention is unpatentable, "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103. An issued patent is presumed valid, so obviousness must be established by clear and convincing evidence. *See, e.g., Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1355 (Fed.Cir. 2007); *Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1339 (Fed.Cir. 2003).
>
> The first step in infringement analysis is to determine the meaning of and scope of each claim in suit. *Amazon.com, Inc. v. Barn esandnoble. com, Inc.*, 239 F.3d 1343, 1351 (Fed.Cir. 2001). Only when a claim is properly understood can a determination be made whether the prior art renders obvious the claimed invention. *Id.*
>
> *KSR Int'l Co.*[*v. Teleflex, Inc.*, 127 S.Ct. at 1727 [2007], which addressed obviousness, directs courts to the framework established in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966), for applying the statutory language of § 103. The Supreme Court emphasized an objective analysis that proceeds as follows:

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *Id*. at 1734 (quoting *Graham*, 383 U.S. at 17-18).

Fisher-Barton, 2008 WL 906125 at *9-10 (footnote omitted).

In considering summary judgment on the question of obviousness, the Court should take into account expert testimony, which "may resolve or keep open certain questions of fact." *Fisher-Barton*, 2008 WL 906125 at *10 (quoting *KSR*, 127 S.Ct. at 1745). A conclusory affidavit will not preclude summary judgment. *Id*. (citing *KSR*, 127 S.Ct. at 1745-46). "The ultimate judgment of obviousness is a legal determination." *Id*. at 1745.[22] This Court also noted that:

> The Supreme Court stated that "the results of ordinary innovation are not the subject of exclusive rights under the patent laws." *Id*. at 1746. However, it also cautioned that courts must avoid

[22]Obviousness is a question of law but its resolution "necessarily entails several basic factual inquiries." *Sakraida v. Ag Pro, Inc*., 425 U.S. 273, 280 (1976). "[N]either the particular motivation nor the avowed purpose of the patentee controls," when determining obviousness. *KSR*, 127 S.Ct. at 1741-42. Instead, courts should determine whether the "objective reach of the claim" encompasses obvious subject matter. *Id*. at 1742. This may include "noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *Id*.

> "falling prey to hindsight bias," "ex post reasoning," and "[r]igid preventative rules that deny factfinders recourse to common sense." *Id*. at 1742-43. Furthermore, "when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." *Id*. at 1740. "A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *Id*. at 1740. A combination is likely nonobvious if the elements work together "in an unexpected and fruitful manner." *Id*. In contrast, a patent is likely to be obvious if it merely yields a predictable result by substituting one element for another known in the field. *Id*.
>
> The Supreme Court explained "a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 127 S.Ct. at 1731. When a work is available in one field, design incentives and other market forces can prompt variations of it, either in the same field or another. *Id*. "If a person of ordinary skill in the art can implement a predicable variation, and would see the benefit of doing so, § 103 likely bars its patentability. . . . A court must ask whether the improvement is more than a predictable use of the prior art elements according to their established principles." *Id*.

Fisher -Barton, 2008 WL 906125 at *10.

There are genuine disputes of material fact which preclude resolution of the issue of the obviousness of the '114 patent. There is a genuine dispute of material fact as to

whether the *Handbook* "teaches away" from some aspect of the '114 patent.[23] Fisher-Barton has presented evidence to dispute the Defendants' contention that the *Handbook* discloses the use of boron steel as a mean of achieving high hardness and high toughness. In seeking summary judgment, the Defendants relied upon a partial quotation of a passage from the *Handbook*. Relying on Perepezko's opinion, Fisher-Barton reasonably maintains that, when read in its entirety, the passage "teaches away" from the use of boron steel as used in the '114 patent.

Perepezko also indicates that it was well known in the art that boron steel was difficult to heat treat to achieve high toughness and high hardness. Krauss disagrees. The parties also offer competing expert opinions on the level of ordinary skill in the art. Perepezko states that one of ordinary skill in the art would have industry experience in the development and treatment of rotary cutting blades. Krauss's view differs from Perepezko's because Krauss indicates that one with ordinary skill in the art would have practical experience in heat treating steel to achieve particular characteristics. Alternatively, Krauss states that such a person would not have the otherwise agreed upon undergraduate degree, but would have several years of hands-on experience and an association, or familiarity, with professional societies such as the ASM International. At this juncture, the Court is presented with factual disputes presented by the competing opinions of the parties' respective experts. The role of this Court on summary judgment is not to weigh the evidence or to resolve factual conflicts.

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[23]A reference is said to teach away when a person of ordinary skill in the art, upon reading the reference, would be discouraged from the path set out in the prior art or led in a direction divergent from the path taken by the applicant. *See In Re Gurley*, 27 F.3d 551, 552 (Fed. Cir. 1994); *see also KSR Int'l Co.*, 550 U.S.___, 127 S.Ct. at 1740.

These conflicts relate to the factors that the Court is required to consider, not secondary considerations as the Defendants imply.

Such concerns are augmented by Fisher-Barton's evidence of secondary considerations indicating that previously the rotary cutting blade industry viewed rotary cutting blades above a hardness of 45 Rockwell C as unsafe due to potential breakage. Indeed, the Defendants kept their boron steel blades under 45 Rockwell C and did not conduct Charpy V notch toughness testing. (Perepezko Decl. ¶ 17, May 7, 2007.) Fisher-Barton submits that confronting that problem and solving it by using boron steel coupled with precise parameters for both hardness and toughness is the type of research and development that is inventive in metallurgy and which advances the field forward. Fisher-Barton has also introduced evidence that since the issuance of the '114 patent the Defendants are offering a blade with high hardness and high toughness. (Perepezko Decl. ¶ 17, May 7, 2007.) The foregoing evidence also weighs against a finding of obviousness.

Fisher-Barton has also proffered evidence of additional secondary considerations, which if accepted by the trier of fact, could counter a finding of obviousness. (See Pl.'s Add'l PFOF ¶¶ 19-26, 38, 40.) While this evidence is disputed, construed in the light most favorable to Fisher-Barton, it could contribute to a finding that the inventions disclosed by the '114 patent claims are not obvious.

Viewing the facts in the light most favorable to Fisher-Barton, the Defendants have not presented clear and convincing evidence establishing that the asserted claims of '114 patent are invalid, as a matter of law, because it is obvious based on the *Handbook*.

NOW, THEREFORE, BASED ON THE FOREGOING, IT IS HEREBY ORDERED THAT:

1. The Defendants' motion for summary judgment (Docket No. 130) is **DENIED** as to non-liability based on Superior's role in the process, is **DENIED** as to non-infringement of claims 1, 2, 3, and 11, and **DENIED** as to invalidity based on anticipation and obviousness.

2. The Court will conduct a telephonic scheduling conference with the parties on **Wednesday October 15, 2008, at 11:00 a.m. (CST)** to set dates for the final pretrial conference and trial in this matter. The Court will initiate the call.

Dated at Milwaukee, Wisconsin this 30th day of September, 2008.

BY THE COURT

s/ Rudolph T. Randa
Hon. Rudolph T. Randa
Chief Judge